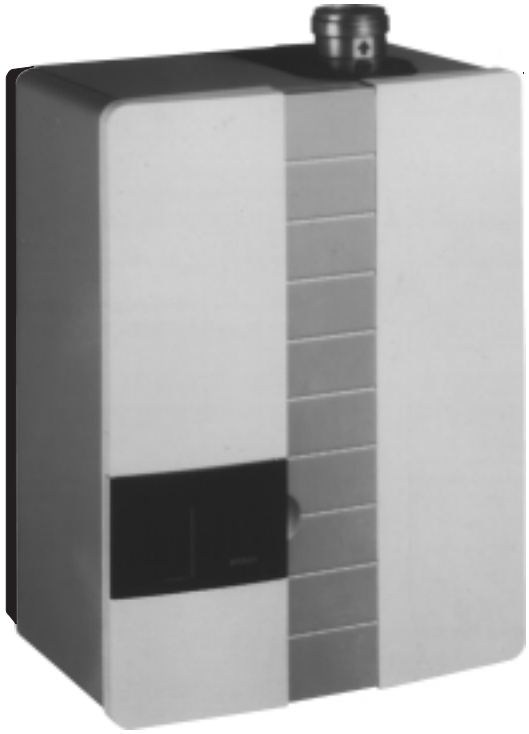
INSTALLATION INSTRUCTIONS

STREBEL

SUPER HR Boiler



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1 Description of the unit

The STREBEL S-HR Boiler is a room sealed, condensating and modulating central heating unit, with or without an integrated hot water facility.
The built-in fan sucks the combustion air from outside and provides full premixing of the gas and air. The gas mixture is guided through the ceramic burner which is fitted above the heat exchanger. As a result of the small flame height a compact construction is possible. The combustion gasses are exhausted after passing through the stainless steel heat exchanger. The formed condensation water is discharged through the waste trap.

The unit has been tested according to valid CE* standards and has a CE* certificate.
The operating efficiency of the unit is higher than 98% (on top value). As a result of its compact construction the radiation, convection and stand by losses are very low. The emission of damaging substances is far below the standard set for equipment with the gas quality-control label for clean combustion.

The unit is provided with an automatic venting program. In case of a recently topped up or filled up installation this program takes care of the removal of any present air. In this case the control will check the water pressure and if it is too low, will report this on the display.

The unit anticipates the heat requirement of the central heating installation or the hot water supply. As a result the unit will adjust its capacity to the installation and will switch on less often, which means that the unit will operate longer and at a low level. It is possible that the unit will only have to switch on once an hour. In this case the aim is to obtain maximum comfort and efficiency.

In order to be able to anticipate installation noises the unit has a so-called gradient control. After the unit goes into operation this control provides a uniform increase of power, instead of immediately burning at full power. When the installation does require full power the control will adjust as required. By this means a uniform increase of the water temperature is effected.
If an outside sensor is connected, the control can operate weather-dependent. This means that the control measures the outside temperature and the flow water temperature. On the basis of this data the control calculates the optimal flow water temperature in the installation.

The S-HR-T combination unit provides a hot water supply by means of a high output calorifier fitted on the right hand side of the unit. An adjustable thermostatic mixing valve is fitted which provides a constant hot water temperature (60˚C factory setting).

2 Scope of the delivery

The unit is supplied ready for use. The supply kit is composed as follows:
- Unit with casing;
- Automatic vent (inside the unit);
- Safety valve (inside the unit);
- Inlet combination and safety valve (only with S-HR-T units);
- Suspension bracket
- Filling and draining valve with T-piece;
- Fixing material consisting of plugs and screws;
- Template on the package wrapper;
- Installation instructions
- Operating manual;
- Installation and user card.

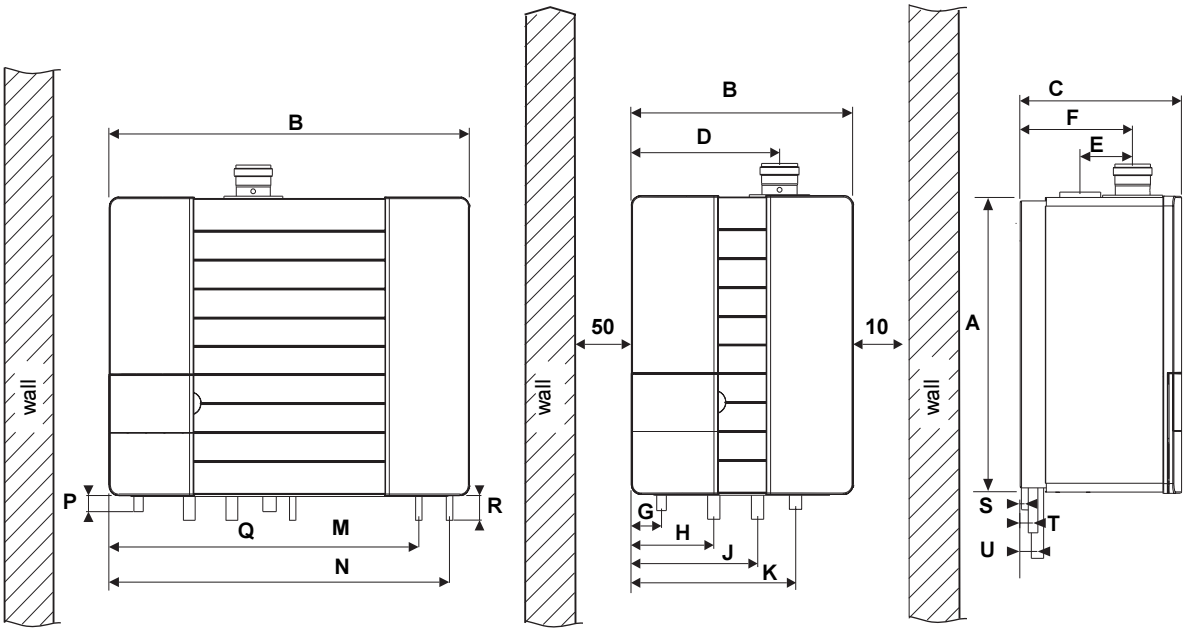
3 Mounting of the unit

The unit can be mounted practically to every wall with the mounting bracket and the included fixingequipment. The wall must be flat and of sufficient strength in order to be able to carry the unit weight.
Above the unit there must be at least 250 mm working space in order to be able to fit a twin supply and exhaust system or 500mm when fitting a horizontal coaxial flue system. On the left side of the unit at least 50 mm and on the right side 10 mm must be reserved in connection with fitting or removing of the casing. The location of the unit can be determined by using the template on the inside of the wrapper.

3.1 Dimensions

	type of unit		S-HR 15	S-HR 24	S-HR 24T	S-HR 35	S-HR 35T	S-HR 51	S-HR 51T	S-HR 60
A	height	mm	680	680	680	680	680	680	680	680
B	width	mm	500	500	840	500	840	660	1000	660
C	depth	mm	370	370	370	370	370	370	370	370
D	left side / flue gas exhaust	mm	335	335	335	335	335	495	495	495
E	centre to centre / flue gas exhaust and supply	mm	120	120	120	120	120	120	120	120
F	back / flue gas exhaust	mm	270	270	270	270	270	270	270	270
G	left side / gas pipe	mm	65	65	65	65	65	65	65	65
H	left side / flow pipe	mm	185	185	185	185	185	185	185	185
J	left side / return pipe	mm	285	285	285	285	285	445	445	445
K	left side / condensation pipe	mm	370	370	370	370	370	530	530	530
L	left side / expansion tank pipe	mm			430		430		590	
M	left side / cold water pipe	mm			725		725		885	
N	left side / hot water pipe	mm			795		795		955	
P	pipe lenght of g*	mm	18	18	18	18	18	18	18	18
Q	pipe lenght of c and k*	mm	40	40	40	40	40	40	40	40
R	pipe lenght of a; r; e and w*	mm	60	60	60	60	60	60	60	60
S	back / centre of pipe c*	mm	25	25	25	25	25	25	25	25
T	back / centre of pipe g*	mm	40	40	40	40	40	40	40	40
U	back / centre of pipe a;r;e;k;w*	mm	50	50	50	50	50	50	50	50

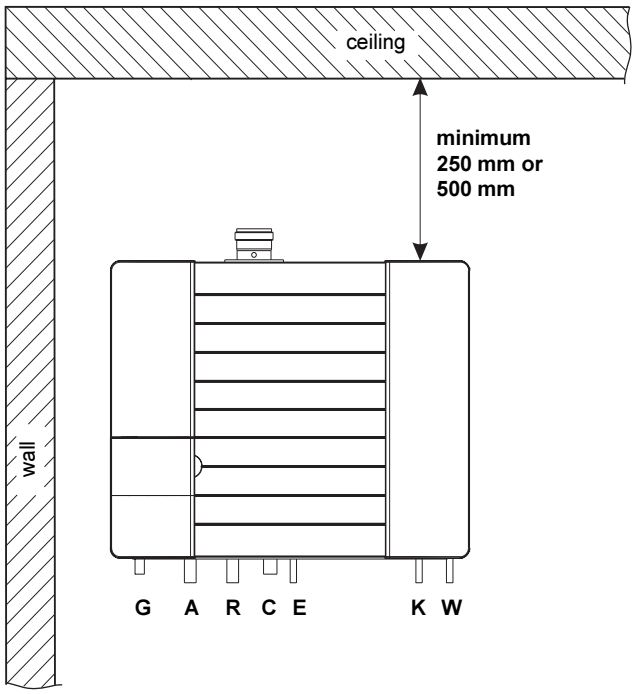
Dimensions table 1



Dimensions (in mm) figure 1

type of unit		S-HR 15	S-HR 24	S-HR 24T	S-HR 35	S-HR 35T	S-HR 51	S-HR 51T	S-HR 60
combustion air supply	mm	80	80	80	80	80	80	80	80
flue gas exhaust	mm	80	80	80	80	80	80	80	80
gas pipe - G		½" inside	½"inside	½" inside	½" inside	½" inside	¾" inside	¾" inside	¾"inside
central heating flow pipe - A	mm	28	28	28	28	28	35	35	35
central heating return pipe - R	mm	28	28	28	28	28	35	35	35
condensation discharge pipe - C	mm	24	24	24	24	24	24	24	24
expansion vessel pipe - E	mm			22		22		22	
cold water pipe - K	mm			15		15		15	
hot water pipe - W	mm			15		15		15	

connection diameters table 2



unit pipes bottom figure 2

4 Connecting the unit

The unit has the following connection pipes;

- The central heating pipes, hot and cold water pipes can be connected to the installation by means of compression fittings;
- The gas pipe of the unit is provided with a female thread into which the tail piece of the gas valve can be screwed;
- The condensation discharge pipe consist of an oval 24 mm plastic pipe. The discharge pipe can be connected to this by means of an open connection. If the open connection is fitted in a different location, then the pipe can be lengthened by means of a 32 mm PVC sleeve;
- The flue gas exhaust system and air supply system consist of 2 x 80 mm connections.

4.1 Central heating system

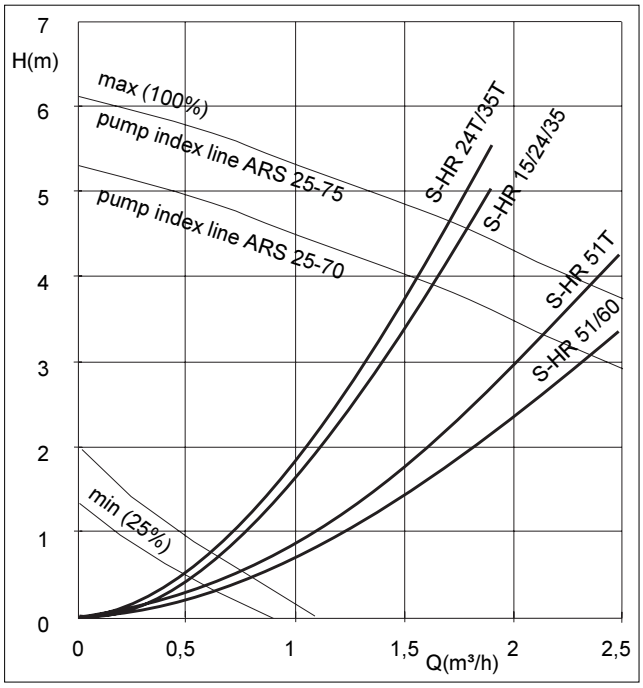
The unit pipes can be connected to the installation by means of compression fittings. Reducers should be used for connecting to thick-walled pipe (welded or threaded).
When removing the plastic sealing caps from the pipes, contaminated testing water can be released.

The unit has a self-adjusting and self-protecting control system for the load and the pump capacity. By this means the temperature difference between the supply and return water is checked. The circulation pump will be able to supply the given water displacement with an installation resistance of up to 20 kPa, for this see table 3.

type of unit	water flow rate ΔT 20°C		permissible installation resistance	
	l/min	l/h	kPa	mbar
S-HR 15	9.9	600	35	350
S-HR 24/24T	15,1	980	25	250
S-HR 35/35T	22,1	1324	20	200
S-HR 51/51T	32,1	1929	20	200
S-HR 60	37,9	2271	12	120

available water flow at full load table 3

If the installation resistance is higher than the stated value the pump will rotate at maximum pump capacity and the load will be adjusted until an acceptable temperature difference between supply and return water has been obtained. If, after this, the temperature difference remains too much then the unit will switch itself off and wait until an acceptable temperature has arisen.

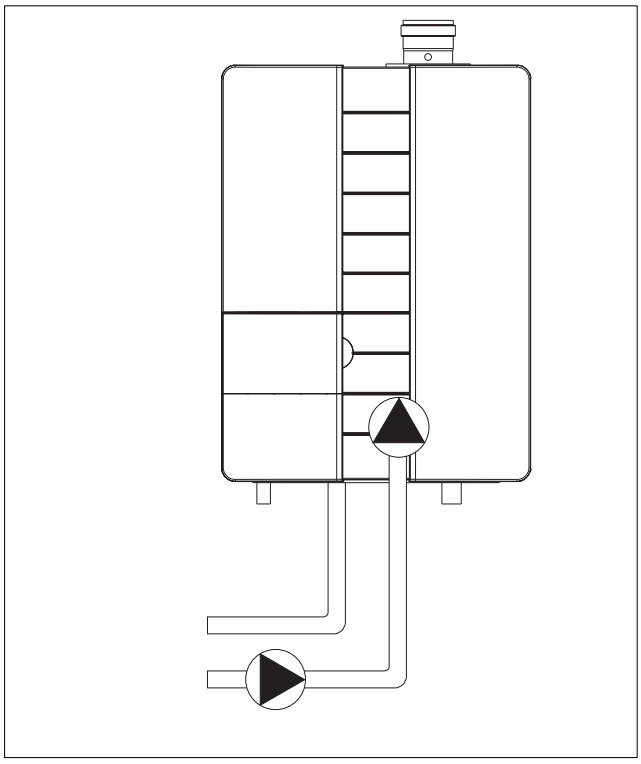


pump index lines graph 1

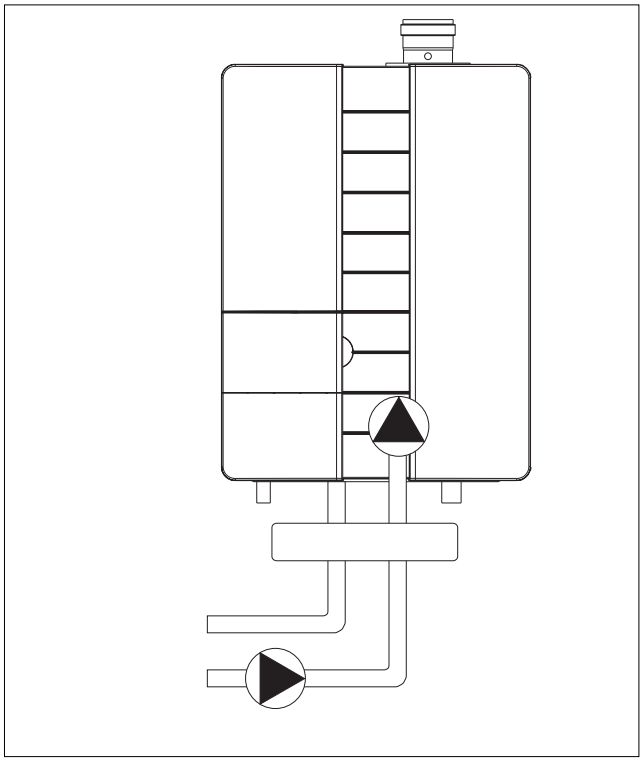
If an unacceptable temperature is detected, then the control will repeatedly try to achieve water flow, and if this does not work then the unit will switch off.

The S-HR 60 unit has a circulation pump which has a residual suction head for the installation of 12 kPa. This means that the unit can function normally in installations which have an installation resistance of up to 12 kPa and in cascade installations.
If the installation resistance is higher than 12 kPa, the unit will automatically reduce in power.

If the capacity of the unit pump is insufficient, an extra external pump can be installed in series with the unit. The electrical side of this external circulation pump can be connected in the Control Tower, by which means this pump switches at the same times as the unit pump.
The maximum absorbed current consumption of the external circulation pump may be 230 W (1 Amp).
Use with a low velocity header can also be selected. In this case a larger secondary sided water output has to be taken into account, in order to affect the height of the water temperature.



external installation pump in series figure 3



external installation pump with low velocity header figure 4

As standard the unit is provided with a water filter in the return pipe of the unit. With this, possible contamination of the central heating water is prevented from ending up in the unit. The unit is also provided with an internal safety valve set at 3 bar. This is connected to the discharge construction to the waste together with the condensation discharge.

If all, or a large part of the radiators are provided with thermostatic radiator valves it is advisable to use a pressure difference control (by pass) in order to prevent flow problems in the installation.

The unit is designed to be used on sealed system only.

Additives in the installation water are only permitted in consultation with STREBEL LTD.

When using more than one unit in an installation please refer to the cascade installation instructions.

4.2 Expansion tank

All STREBEL S-HR-T units are provided with an expansion tank on top of the calorifier. This expansion tank is connected to the three-way valve and the circulation pump. By this means the expansion water, when functioning for the hot water supply, is prevented from being shut off from the expansion tank when the radiator thermostat valves are fully closed. A second expansion tank in the installation is not a problem.

The STREBEL S-HR units are not equipped with an expansion tank pipe. If a S-HR unit is combined with an Comfort calorifier, the expansion tank connection is included in the internal piping of the Comfort calorifier, to which the expansion tank can be connected. If a different calorifier is used then one has to take into account that the expansion tank should be connected between the three-way valve and the unit circulation pump.

In connection with correct functioning of the unit it is necessary for the expansion tank to be connected to the expansion tank pipe of the unit.

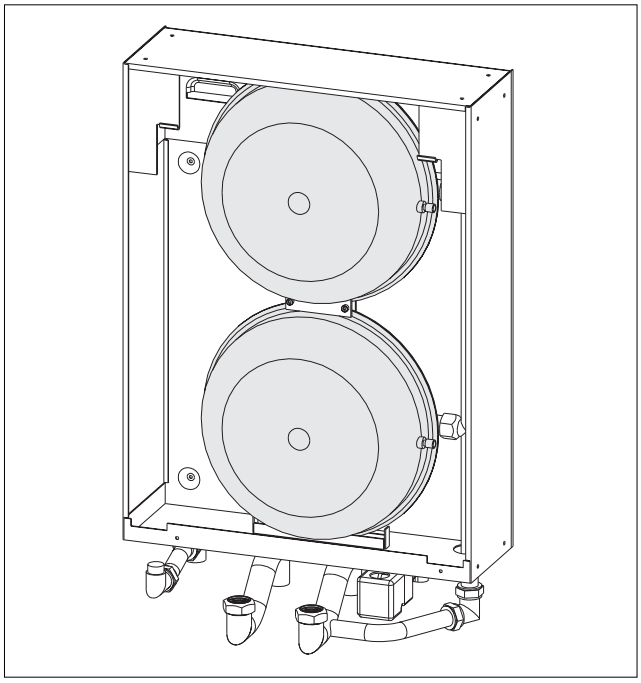
The expansion tank which is used should be geared to the water content of the installation. The pre-pressure depends on the installation height above the mounted expansion tank.

installation height above the expansion vessel	pre-pressure of the expansion vessel
5 m	0,5 bar
10 m	1,0 bar
15 m	1,5 bar

choice of expansion tank table 4

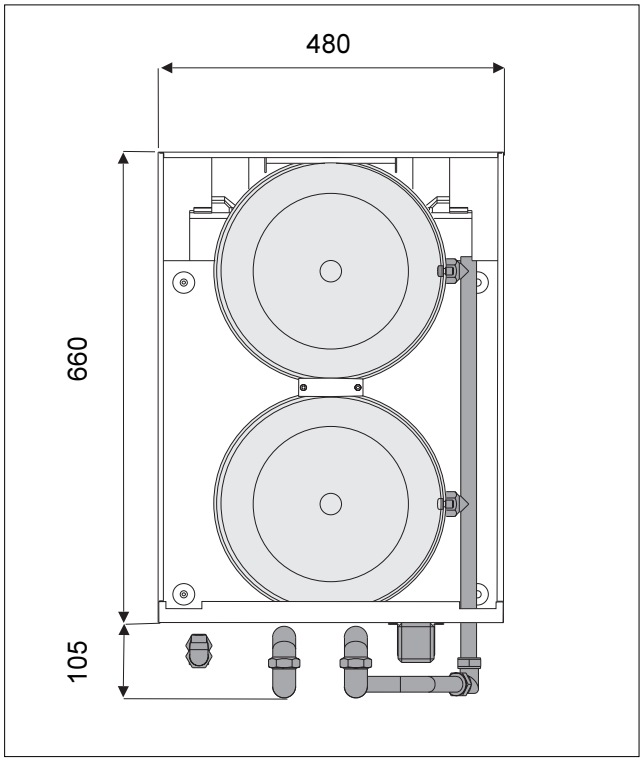
The STREBEL S-HR24 and S-HR35 units can be provided with an expansion tank module. By this means the external expansion tank is cancelled. This expansion tank module is placed behind the S-HR unit, by which means the expansion tank is not noticeable. If the S-HR unit is provided with a STREBEL Comfort calorifier the overall depth will be equal. The content of the two expansion tanks is 20 litres. The pre-pressure is 1 bar.

The expansion tank module can be supplied with the necessary pipes to connect with the S-HR unit. The connecting pipes for the installation correspond with those of the unit and have the same centre-to-centre distance to the wall. When checking the expansion tanks these are accessible via the left, right and upper sides. From these sides the tanks are also removable and the unit does not have to be dismantled.

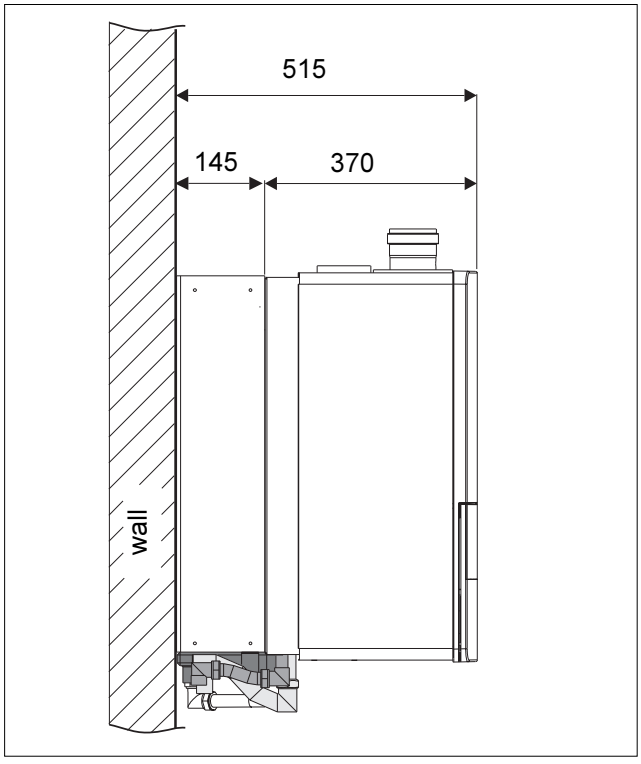


expansion tank module figure 5

The space which is required for mounting the expansion tank module corresponds with the required space for mounting a S-HR unit. The included template and mounting strip for the S-HR unit can be used for the expansion tank module. The S-HR unit is fitted on to this after the expansion tank module has been mounted. The necessary mounting strip for the unit is present on the module.



front view of the expansion tank module (dimensions in mm) figure 6



side view of the module with S-HR unit (dimensions in mm) figure 7

Article numbers:
- the expansion tank module without pipe connections AEMO209U
- pipe connections for expansion tank module ALE0004U

4.3 Underfloor heating systems

When connecting or using an underfloor heating system fitted with plastic pipes one has to take into account that the plastic pipes used meet the DIN 4726/4729 standard. It is stated in this standard that the pipes may not have a higher oxygen transmittance than 0.1 g/m³.d at 40°C. If the system does not meet this DIN standard, then the underfloor heating section will have to be separated from the central heating unit by means of a plate heat exchanger.

⚠ **In case of non-compliance with the regulations concerning plastic underfloor heating pipes, no claims can be made against the guarantee conditions.**

4.4 Gas pipe

The unit pipe is equipped with a female thread, into which the tail piece of the gas valve can be screwed.

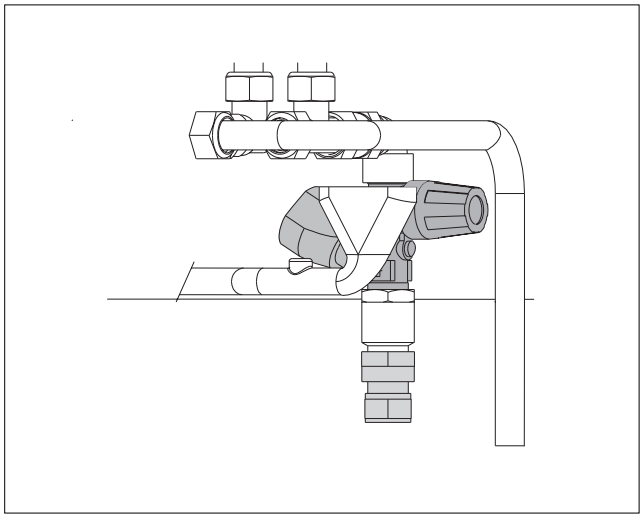
The Gas Safety (Installation and Use) Regulations 1994:
It is the law that all gas appliances are installed by CORGI registered contractors in accordance with the above regulations. Failure to install appliances correctly could lead to prosecution. It is in your own interest, and that of safety, to ensure that the law is complied with".

For good operation of the unit it is necessary that the pre-pressure of the unit is higher than 20 mbar.

⚠ **Make sure that the gas pipe work does not contain dirt, particularly with new pipes.**

4.5 Hot water supply (S-HR-T)

The unit pipes can be connected to the installation by means of compression fittings. The unit is provided with an inlet combination and safety valve set at 8 bar. Together with the condensation discharge and the discharge of the central heating safety valve (3 bar) this is connected to one waste connection pipe.



inlet combination and safety valve figure 8

A flow regulation valve is fitted in the cold water pipe. The flow regulation valve provides that a quantity of water is supplied which has a guaranteed outlet temperature of 60°C (assuming a cold water temperature of 10°C). The quantity of water is virtually unaffected by the water pressure. With a water pressure lower than 1.5 bar it is advisable to remove the inside mechanism of the flow regulation valve. Connecting of the drinking water installation should be done according to the water BYE-laws.

4.6 Condensation discharge pipe

The collective condensation discharge pipe should be connected to the waste by means of an open connection. By this means the possibility of sewer gases ending up in the unit is prevented. The waste connection should have a minimum diameter of 25 mm.

The following components are connected to the collective condensation discharge pipe:
- Condensation discharge;
- Safety valves;
- Inlet combination (S-HR-T)

⚠ **Discharging of the condensation water to the precipitation discharge is not permitted in view of the danger of it freezing.**

⚠ **Before putting the unit into operation fill the trap with 300 ml of water.**

4.7 Flue gas exhaust system and air supply system

The unit connection diameter is Ø 80 mm. to which the flue gas discharge and air supply system can be fitted with or without bends.
The maximum usable pipe length is stated in table 5.

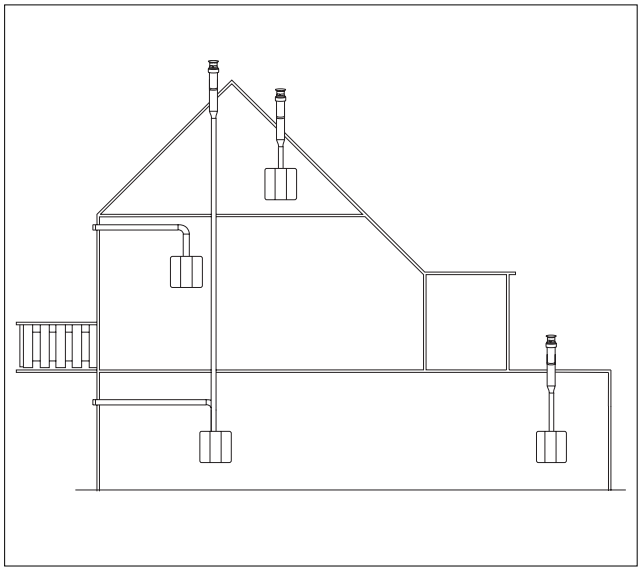
It is advisable to use stainless steel discharge equipment for the flue gas discharge. By using the STREBEL icicle-free trough the roof kit, ice-forming around the flue terminal is prevented. For the air supply plastic can be chosen. If a plastic discharge system is installed the unit has to be equipped with a flue gas thermostat. This flue gas thermostat is available from STREBEL LTD.

With the flue gas discharge system and air supply system the following is meant:
- the flue gas discharge pipe;
- the air supply pipe;
- through the roof kit or wall terminal.

The maximum stated pipe length in metres is for both the supply as well as the exhaust system and is the distance between the unit and the roof or wall terminal.		
type of unit	**maximum pipe length in metres with a diameter of 80 mm**	**maximum pipe length in metres with a diameter of 90 mm**
S-HR 15	30	40
S-HR 24/24T	25	40
S-HR 35/35T	18	36
S-HR 51/51T	10	20
S-HR 60	6	13
When using bends in the supply or exhaust system, the length mentioned below, this corresponds with the resistance of the bend, has to be added to the pipe length. Example: S-HR 24 with 10 metres exhaust duct ø 80 mm and 2 x 90° bends. This means: 10 metres + 2 x 1,25 metre = 12,5 metre.		
bend 90°	1,25	1,5
bend 45°	1	1,25

length supply and exhaust system table 5

For further information regarding the supply range of the exhaust and supply system please contact STREBEL LTD.



supply and exhaust system figure 9

The flue gas exhaust and the air supply installation must be installed in accordance with British Standards.

The exhaust system should always be installed sloping towards (30 mm/m) the unit, in order for condensation water not to gather in the exhaust system. With condensation water flowing back to the apparatus the chance of ice forming on the trough the roof kit is minimal. In case of horizontal outlets the supply system has to be installed sloping outside in order to prevent rain coming in.

It is superfluous to install an extra condensation collecting unit.

⚠ **In operation, the unit produces a white condensation plume. This condensation plume is harmless but can be experienced as disturbing especially in the case of outlets in the wall. For this reason it is advisable to exit at roof level.**

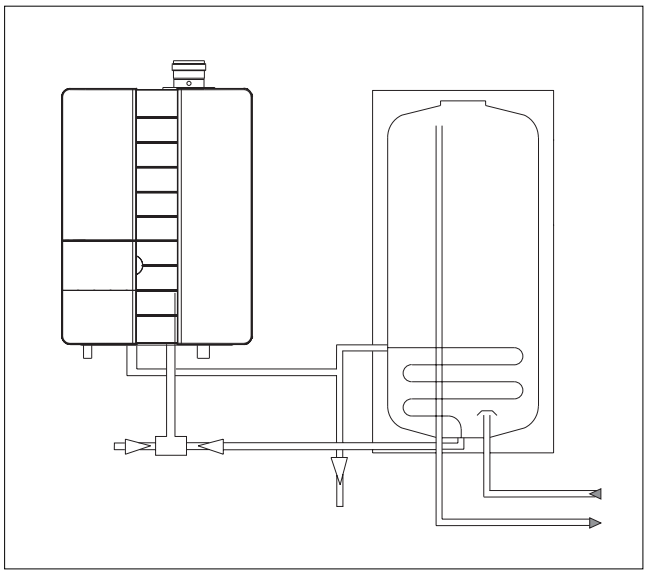
⚠ **The apparatus is not suitable as an "open" unit. This means that the combustion air always has to be brought from outside.**

⚠ **Where the unit is installed in a compartment, ventilation is required as per BS 5440.**

5 External calorifiers

Various external calorifiers can be connected to a S-HR unit, depending on the comfort requirements. The wiring of the calorifier thermostat can be connected to the connection block in the Control Tower by means of the relevant plug.
Calorifiers which are used together with the S-HR boiler should be of the quick recovery type.

S-HR51 and S-HR60
Consult STREBEL when using calorifiers with lower absorption than 20kW or primary pipe and/or coil size less than 3/4 inch.



S-HR with calorifier figure 14

6 Electrical connection

The unit complies with the CE machine guidelines 89/392/EEC.

The installation must be in accordance with:
- Current I.E.E. Regulations;
- Local Regulations;
- A visible electrical isolation switch must be fitted adjacent to the boiler complete with an earth.

The apparatus complies with the following regulations:
- low-voltage guideline 73/23/EEC
- EMC guideline 89/336/EEC

Furthermore the following general regulations are valid:
- no modifications may be made to the wiring of the unit;
- all connections must be made to the connection block.

The Brain room thermostat and controls must be connected to their allocated connections. All other types or makes of room thermostats or controls which are used must have a potential-free contact

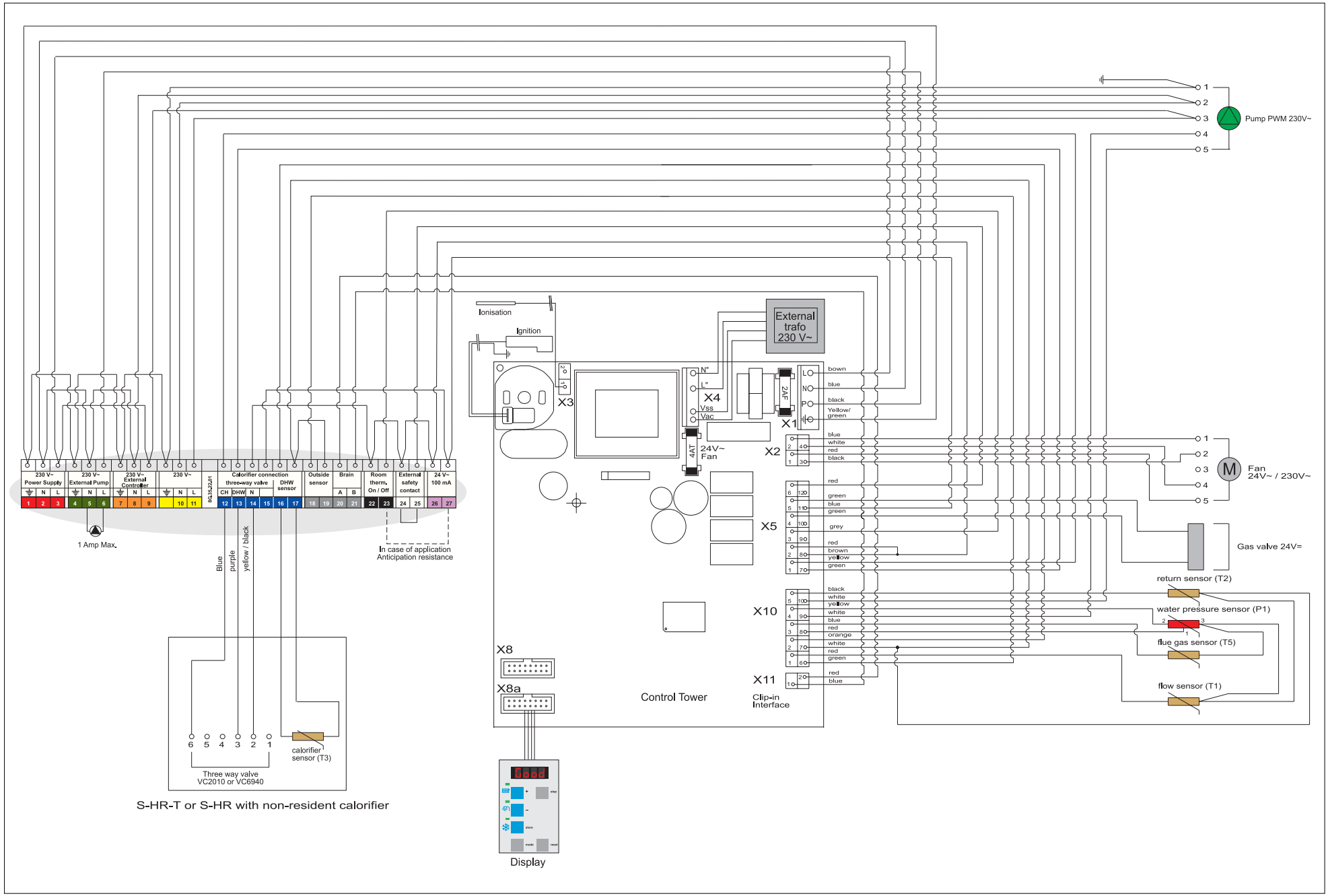
When using an on/off thermostat or control, it is possible that an anticipating resistance must be installed in order to prevent too high temperature fluctuations. As a standard rule this means mercury thermostats. This resistance wire is present in the Control Tower and must be connected to clamps 23 and 27. The anticipating resistance in the room thermostat has to be set at 0.11 A.

For more detailed questions regarding the components which are not supplied by STREBEL, the supplier concerned should be contacted.

The connections of the Brain Interface and the wiring of the three-way valve with the calorifier sensor are only applicable if they are installed in the Control Tower.

Connection block in the Control Tower

230 V~ Power Supply			230 V~ External Pump			230 V~ External Controller			230 V~			8G.35.22.01	Calorifier connection three-way valve				DHW sensor		Outside sensor		Brain		Room therm. On / Off		External safety contact		24 V~ 100 mA	
⏚	N	L	⏚	N	L	⏚	N	L	⏚	N	L		CH	DHW	N						A	B						
1	2	3	4	5	6	7	8	9		10	11		12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
mains power supply			230 Volts for external pump			230 Volts for external control			230 Volts				internal or external three-way valve motor and calorifier sensor						STREBEL outside sensor		Brain clock thermostat		On/off thermostat or control		External safety contact		24 Volts maximum 100 mA	



electrical connecting diagram

figure 11

7 Control of the unit

The unit is provided with a self-adjusting control called the Control Tower. This control takes over a large part of the manual adjustments which means putting the unit into operation has been extensively simplified. After plugging the plug into the wall socket the unit will not undertake any operating action and no operating lamps will be lit.

On the display the relevant status will be shown. Reading out of the status can be done in two ways.

The first way is a simple read out called the Good status. The unit will only show the Good indication. During this read out the unit can be in normal operation without this showing in any other way. If it is necessary to show a report it will be shown on the display.

The second way is the technical way which shows a more extensive read-out with, among others, the position in which the unit is active with the flow water temperature and the water pressure of the central heating system.
The second level is reached from the Good indication after pressing the STEP key for 5 seconds. Returning to the Good indication is done the same way.

Only when activating the operating program 'pump circulating' after filling up the installation, will the automatic venting program start as standard after pressing the ❄ PC program key. This automatic venting program takes 15 minutes and stops automatically. After this the unit will function for the activated part.

In case of a heat requirement, which arises for central heating or hot water, a certain flow water temperature will be calculated. This calculated water temperature is called the T-set value. This value becomes active in case of a demanding room thermostat after which the unit power will be adjusted. With a recently started unit a build-up delay of the T-set valve is active. The main purpose of this is to prevent the unit going into operation at full power due to which disturbing noises and unnecessary temperature peaks can arise. In the case of heat requirement from the hot water supply the T-set valve on the central heating return water temperature is adjusted. Depending on the amount of domestic water which is withdrawn from the calorifier, the central heating return water temperature, which adjusts the load of the unit, will vary.

⚠ **Each time the mains power supply to the boiler is broken, the automatic venting program will re-start once there is power to the boiler.**

7.1 Explanation of the function keys

Key functions from the Good and the extensive indication are:

- Central Heating program key, see chapter 10.1;
- Hot Water program key, see chapter 10.2;
- ❄ PC program key, adjusts the pump to continuous water circulation in the central heating system, or according to the pump overrun times on the relevant programs;
- Mode key, after briefly pressing, a selection of the data chapters can be retrieved. After pressing for 5 seconds it is possible to enter the code as described in chapter 10.3;
- Step key, after briefly pressing, the water pressure can be retrieved and pages per chapter can be retrieved. After pressing for 5 seconds it switches from Good indication to technical indication and the other way round;
- Reset key, after briefly pressing, for:
  unlocking errors;
  ending the access code;
  ending the automatic venting program, only when the access code is entered and the reset key is pressed briefly.
  After pressing for 5 seconds an operating stop is made, for example, for activating the automatic venting program.

Other key functions from the other indications are:

- Central Heating key then has the + function;
- Hot Water key then has the - function;
- ❄ PC key then has the store function, which means that by means of this key a modified setting is confirmed;
- Step key for scrolling in a data chapter.

8 Filling and venting of unit and installation

Filling of the installation can be carried out according to the usual method. In order to read out the central heating water pressure the unit plug should be plugged into the socket.
The circulation pump will not begin to operate as long as the operating lamps are off. The control display will show a FILL indication, which means that the control is signalling insufficient water pressure. If the installation is filled and the water pressure rises then the water pressure will automatically be shown with an alternating FILL text. If the water pressure rises to above 1.5 bar then after a short “stop” text the Good indication will appear, which means the water pressure is sufficient and the unit is ready for operation.
In order to be able to read out a constant water pressure the Step key should be pressed in and in order to obtain a constant Good readout the Step key should be pressed briefly again.

If the water pressure in the unit becomes too high (>3.5 bar) a HIGH text appears, by which means the burner is switched off. After draining the water from the installation, by which means the water pressure arrives below 3 bar, the HIGH text disappears and the burner is activated.

In order to go from a Good read-out to a technical 0 19 readout the Step key should be pressed for 5 seconds. This read-out can be selected if the user requires a technical read out. In order to return to the Good read-out the Step key must be pressed again for 5 seconds.

8.1 Central heating system

For filling the central heating installation you use the filling and draining valve.

Filling is done as follows:
- Plug the unit plug into the wall socket and leave the operating lamps off;
- Connect the filling hose to the cold water tap and let it fill with water;
- Connect the filled filling hose to the filling and draining valve and open this valve;
- Open the cold water tap and fill the installation slowly;
- The unit has an automatic vent which removes the air which is present;
- Start venting the radiators and pipes at the lowest point;
- Bring the installation to pressure (1.5 to 2 bar) after all radiators and pipes have been vented;
- Close the cold water tap and the filling and draining valve;
- Activate the automatic venting program by pressing the pump ❄ key which means the pump lamp will be lit. Allow the control to finish its venting program. The pump will circulate a number of times around the boiler as well as the central heating installation.
  Also, if a three-way valve, if present, this will be adjusted to the boiler and central heating installation a number of times. The pump will be stopped regularly in order to allow possible present air to escape.
- Check the water pressure and if required top up. The working pressure in the installation should be between 1.5 and 2 bar in cold state.
- After finishing the automatic venting program the key ❄ can be switched off again.

⚠ **It can take a while before all air has disappeared from a filled installation. Especially in the first week noises can be heard which indicate the presence of air. The automatic air vent in the unit will make this air disappear, by which means the water pressure can reduce during this period and therefore topping up with water will have to be done.**

8.2 Hot water supply

Apply the water pipe pressure to the calorifier (open main valve and/or stop valve of the inlet combination valve).

Vent the calorifier and the hot water installation by opening a hot water tap. Leave the tap open for as long as required until all air has disappeared from the calorifier and the pipes and only water is flowing from the tap.

9 Putting the unit into operation

Before putting the unit into operation make sure, that the unit and the installation are well vented. Vent the gas pipe and open the gas valve for the unit. The unit does not require adjustment of burner pressure and air quantity because it is self-adjusting and is factory-set at the correct value.

9.1 Central Heating system

Provided there is a heat requirement from the thermostat or control, the central heating program will be put into operation by means of the key (central heating program). The circulation pump will start circulating and the unit will start the burner.

9.2 Hot water supply

Provided there is a heat requirement from the boiler the hot water program will be put into operation by means of the key (hot water program).

9.3 Adjustments

In the Control Tower a number of adjustments can be made. These adjustments can be fed in easily by means of the keys on the unit. However, a distinction is made between adjustments which are done by the user and adjustments done by the installer.
At users level adjustments can only be made from the technical read-out in other words from the display read-out with the operating function and the water temperature. Adjustments can not be made from the Good indication.

The next two chapters are accessible after pressing the Mode key:

Chapter 1 StBy
The normal operating functions such as the simple Good read out or the technical P 1.9 with the 0 49 read out.

Chapter 2 PArA
The chapter in which adjustments can be made.

User parameter adjustments				
Step		**description**	**factory**	**range**
1		maximum flow water temp. central heating	85°C	20 - 90°C
2		type of central heating system	01	1 - 4
	01	radiators; air heating; convectors		
		T max flow water	85°C	autom.
		K factor heating line	2.3	autom.
		gradient	5°C/min	autom.
		gear differential	6°C	autom.
	02	radiators with large surface areas or underfloor heating as additional heating		
		T max flow water	70°C	autom.
		K factor heating line	1.8	autom.
		gradient	5°C/min	autom.
		gear differential	5°C	autom.
	03	underfloor heating with radiators as additional heating		
		T max flow water	60°C	autom.
		K factor heating line	1.5	autom.
		gradient	4°C/min	autom.
		gear differential	4°C	autom.
	04	full underfloor heating		
		T max flow water	50°C	autom.
		K factor heating line	1.0	autom.
		gradient	3°C/min	autom.
		gear differential	3°C	autom.
10*		fine adjustment heating line day temperature	0	-5 tot 5
11*		fine adjustment heating line night temperature	0	-5 tot 5
23		frost safety temperature	-3°C	-20 tot 10°C
31		switch-off temperature of additional cylinder with S-HR boiler	63°C	40 - 80°C
48		minimum pump capacity (S-HR 51/60)	25%(50%)	25-100%

user adjustment possibilities table 6

User adjustments

To switch from the Good level to the opera-ting status level with the read out of the operating functions 0 49, the water tempe-rature and the water pressure P 1.9, the following acts must be carried out. From the display read-out, press the Step key for 5 seconds after which the operating status and the water temperature will be shown for 8 seconds and the water pressure for 2 seconds. If, after this, the Mode key is pressed briefly the “adjustments” chapter is displayed by means of the text PArA. By pressing the Step key briefly the adjustment facilities are shown. Adjustment of the fixed value can be done by means of the ‘+’ or the ‘-’ key. Confirmation of the new setting is done with the Store key.

*** Brain thermostat**

Most of the adjustments which are stated in tables 6 and 7 are unnecessary when in combination with the Brain and will be taken care of by the Brain itself and do not have to be adjusted. Most of the data in table 8 can be requested by the Brain. For further information with regard to the Brain thermostat we refer to the Brain thermostat installation manual.

In order to gain access to the adjustments at installers level the entrance code has to be fed in first. For this the following operations have to be carried out.

Press the Mode key for 5 seconds. The text CodE is shown, after which a random number appears on the display. By means of the + or the - key the code C 123 can be fed in. After pressing the Store key the code is confirmed. With this entrance to the installers level is given.

The next chapters are shown after pressing the Mode key:

Chapter 3 INFO
The chapter where information can be retrieved.

Chapter 4 SErU
The chapter in which adjustments can be made for service purposes.

Chapter 5 Err0
The chapter in which error data can be retrieved.

Installers adjustments

Adjustments whereby technical knowledge is required have been classified under the installers level. Access to this level is obtained after feeding in a code, after which adjustments for user and installer are visible. For going to the “Adjustments Parameters” chapter the Mode key should be pressed once after which it is shown with the PARA text. Scrolling in the Parameter chapter can be done by means of the Step key. Adjusting the fixed value can be done by means of the “+” or the “-” key. Confirming the new adjustment is done with the Store key.

Extra parameter adjustments installer				
Step		**description**	**factory**	**range**
3		max power central heating in kW	maximum	min-max
4*		control principle with on/off thermostat	0	0 - 1
	0	100% on/off thermostat		
	1	100% on/off weather dependent		
5*		heating line K factor	2.3	0.2 - 3.5
6*		heating line exponent	1.4	1.1 - 1.4
7*		heating line climate zone	-10	-20 - 0
14*		gradient speed	7	0 - 15
15*		booster after night reduction	0	0 of 1
	0	no		
	1	yes		
36		type of three-way valve	0	0 - 3
	0	VC 2010		
	1	VC 6940 modulating		
43		max power power hot water in kW	maximum	min - max
49		max pump capacity central heating	100%	40 - 100%
89		address setting interface	0	-1 - 7
	-1	spare		
	0	Brain		
	0-7	boiler 1 - 8 in Cascade		

installer adjustment possibilities table 7

Information chapter.

After feeding in the access code the information can be read out according to table 8. In order to select the information chapter the Mode key must be pressed twice after feeding in the code. New adjustments can not be done in this chapter. Scrawling in the information chapter is possible by means of the Step key.

Information mode installer		
Step	**description**	**value**
1	flow water temperature T1	°C
4	return water temperature T2	°C
5	calorifier water temperature T3	°C
7	outside temperature T4	°C
8	flue gas temperature T5	°C
16	present power in %	%
17	present power in kW	kW
18	present load in kW	kW
20	control bus communication	
21	GJ consumption total	GJ
22	GJ consumption central heating	GJ
23	GJ consumption hot water	GJ
24	total number of burner run hours	hour
25	number of burner run hours central heating	hour
26	number of burner run hours hot water	hour
32	total number of hours counter	hour
46	within how many hours is service required	hour

installer information possibilities table 8

Service chapter.
After the access code has been fed in it is possible to temporarily manually adjust the number of revolutions of the fan in the service chapter (table 9). In order to select the service chapter the Mode key has to be pressed 3 X after feeding in the access code. By means of the Step key the first function is displayed with the text Off. By means of the + or - key a required number of revolutions for the fan can be selected while the unit is operating.
With Step 4 it is possible to activate the showroom position by pressing the + key after which the text “on” appears in the display.
After this a simulated water pressure of 1.9 bar and a water temperature will be indicated. Pump or burner action is not possible. After a voltage interruption or a reset the showroom position is switched off.

Service mode installer	
Step	**description**
1	boiler in operation with burner function on
2	fan adjustable and burner off
3	pump adjustable with burner on
4	showroom position ON = active and OFF = non active

installer service possibilities table 9

Error chapter.
After the access code has been fed in the Error chapter can be read (table 10). In order to select the Error chapter it is necessary to press the Mode key 4 X after feeding in the access code. By means of the Step key the functions are shown which were stored when the unit went into an error state. The first error which is shown is the last, the next error is the second last, etc.

In order to return to the normal technical read out whereby the water temperature and water pressure are shown, the Standby chapter must be requested by means of the Mode key. After a few seconds the text standby will be replaced by the technical read-out.
Other wise returning to the “Good” read-out automatically occurs after 20 minutes in the event that no more keys have been used.

Error mode installer		
Step	**description**	**value**
1	error number	
2	operating status unit	
3	flow water temperature T1	°C
4	return water temperature T2	°C
5	load	kW
6	pump capacity	%

installer error possibilities table 10

Green key function
The green key function can be used in order to activate the factory settings. By this means the modified settings are cancelled. The following actions must be carried out. Make sure that chapter is shown in the display by means of the Mode key. After this press the Store key. The word Copy becomes visible and the factory settings will be active again.

10 Switching off the unit

In some situations it may be that the entire unit must be switched off. By switching off the three keys with the lamps for central heating, hot water and pump program, the unit is switched off. STREBEL advise to leave the plug in the wall socket, by which means the circulation pump and the three-way valve are activated once every 24 hours in order to prevent jamming.

⚠ **In the event of frost danger it is advisable to drain the unit and/or the installation.**

11 Commissioning and maintenance

The top of the casing is hooked behind a locking edge and is locked behind the door on the front of the casing with a screw. After removing this screw the casing must be lifted at the bottom by which means it is released from the locking edge. Then the casing can be removed forward.

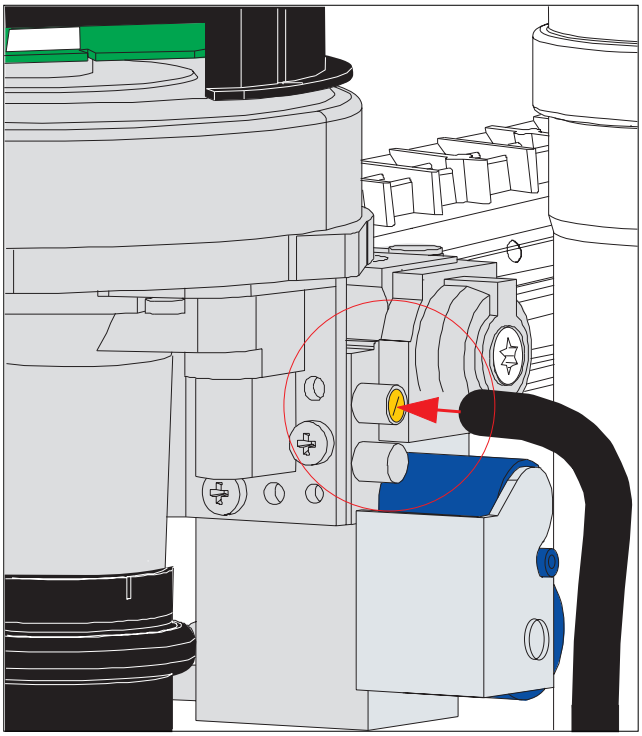
With the S-HR settings such as burner pressure and adjustment of the air quantity are unnecessary, due to the fact that the unit operates with a so-called zero pressure control. By this means the correct gas quantity is controlled by the suction operation of the fan. The fine adjustment which is carried out at the factory is once-only, which means that adjusting of these values is unnecessary.

11.1 Checking for contamination

In order to be able to check the unit for contamination in the following running years it is advisable to measure the maximum air displacement in the unit when putting the unit into operation. This value can be different with each type of unit.

In order to be able to measure this value the following operations must be carried out:

- in order to enter the service chapter feed in the access code as described on page 18;
- select the manual fan setting without burner action Step 2, by means of the Step key which will indicate that the fan is off OFF;
- connect the digital pressure gauge hose to the uppermost measuring nipple of the gas block according to figure 12 (open it before fitting the hose);



measuring point air pressure difference figure 12

- take the fan to its maximum number of revolutions by means of the + key;
- measure the pressure difference and write down this value;
- when next servicing the unit the value of the fan output may not have reduced by more that 20% compared to the value during commissioning. If this value is lower than 20% the unit does not require maintenance.

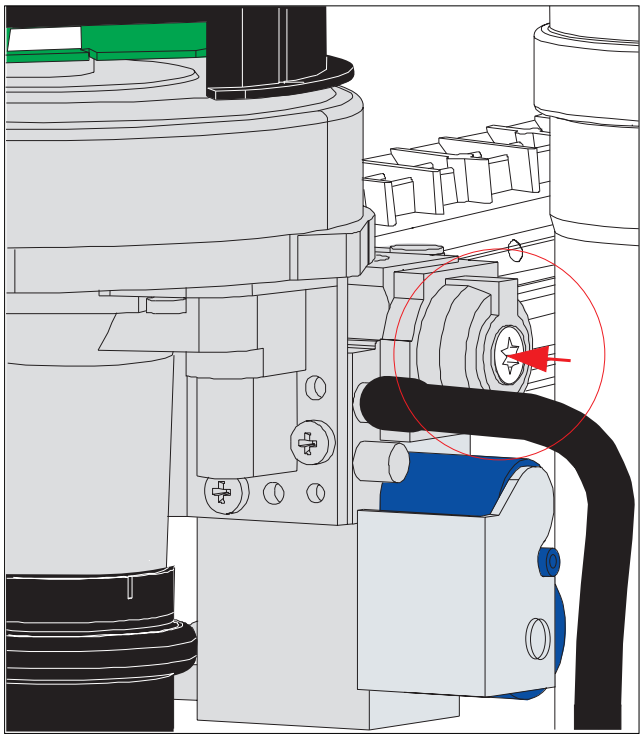
11.2 Checking of the zero pressure control

The zero pressure control is set at the factory. This can be checked by means of the following action;

- make sure that the unit is in operation and that it can discharge the heat which it produces;
- in order to enter the service chapter feed in the access code as described on page 18;
- select the manual fan adjustment with burner action Step 1 by means of the Step key, which will indicate that the manual operation is off OFF;

- connect the digital pressure gauge hose to the uppermost measuring nipple of the gas block according to figure 13;
- activate the manual control by briefly pressing the "-" key;
- take the fan to minimum load by means of the "-" key, after which the measured pressure difference must be between 0 and -4 Pa ;
- ending the manual selection is done by pressing the "-" key until the minimum load is displayed. After pressing this key again the text OFF is shown which means that the manual selection is off.

If it is determined that the zero pressure control deviates too much, then it can be corrected by means of the adjustment screw on the gas block.

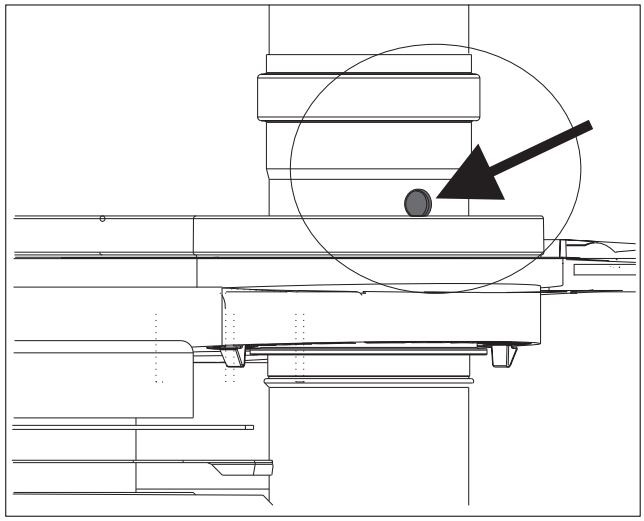


adjustment screw zero pressure control figure 13

11.3 Checking the CO_2

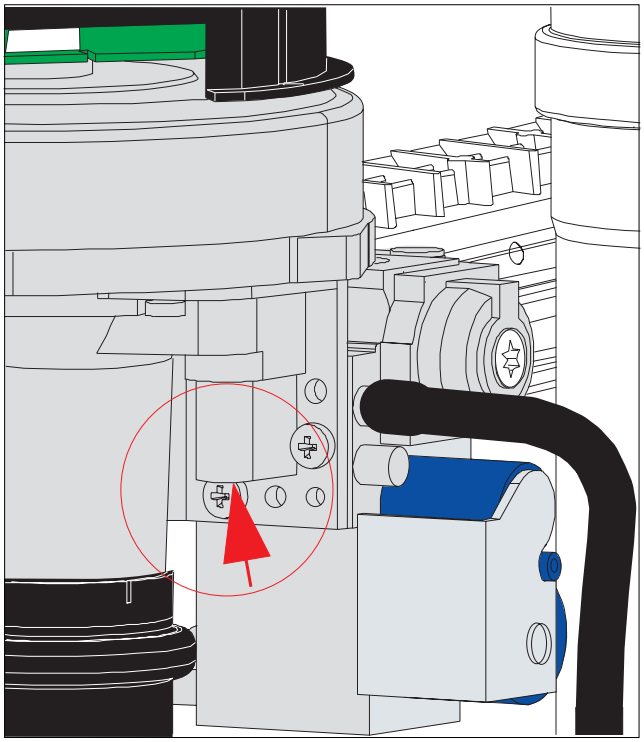
The CO_2 percentage is factory-set. This can be checked by means of the following actions:

- put the unit into operation by means of the service chapter as described in chapter 11.2;
- place the lance of the CO_2 gauge in the location according to figure 14;
- adjust to maximum load by means of the "+" key;
- ending the manual selection is done by pressing the "-" key until the minimum load is shown. After pressing this key again the text OFF is shown which means that the selection is off.



measuring point for CO_2 figure 14

- adjust the CO_2 percentage according to table 11. The CO_2 percentage can be adjusted by means of the adjustment screw according to figure 15.



adjustment screw CO_2 figure 15

11.4 Maintenance

If it is necessary to clean the unit the following actions to the following components must be carried out:

The air unit
Dirt which is sucked in by the air supply pipe will end up in the bottom of the air box. This dirt can be cleaned with a cloth with a simple (non-abrasive) cleaning agent.

Do not use an abrasive agent for cleaning, this causes disturbing scratches in the air box.

The burner ceramic bricks and heat exchanger
These components should only be cleaned if it is determined that the maximum Pa is no longer obtained as described in chapter 12.1.

The fan unit must be removed in order to be able to inspect the heat exchanger. In this case the following actions must be carried out:
- close the gas valve and isolate the units electrical supply;
- turn the Control Tower forward around its left hinge point and remove the plastic air box;
- loosen the nut of the gas pipe under the gas block;
- loosen the small crosshead screw on the red electrical connection adaptor of the gas block;
- remove the electrical connection plug from the fan motor;
- loosen the front crosshead screw of the black plastic air inlet damper;
- after this turn the two clamping rods ¼ turn and remove them by pulling them forward;
- slightly lift the fan unit and remove it towards the front of the heat exchanger;
- the fan unit and the air inlet damper can be checked for contamination and if necessary cleaned;
- now remove the burner ceramic bricks by slightly lifting them upward and removing them in the same direction as the heat exchanger fan unit;
- the burner ceramic bricks and the heat exchanger can be cleaned by means of a soft brush;

Refitting of the components is done in reverse.

The following components require extra attention before and after refitting:
- make sure that the gasket for the ceramic bricks is fitted onto the heat exchanger precisely;
- make sure that the fan unit clamping rods have been pushed backward sufficiently and that they have again been turned ¼ turn;
- make sure that the gas connection under the gas block is tightened;

The waste trap
In order to check the waste trap for contamination the following actions must be carried out:
- make sure that the unit is off by isolating the units electrical supply;
- turn the Control Tower forward around its left hinge point;
- turn the waste trap cup to the left until it is released from the screw thread;

Do not use pliers or wrenches for removing the waste trap cup

Refitting is done in reverse order.

11.5 Further checks

Checking the ionisation current.
- ionisation determines if there is a flame present with correct combustion. The measurement is done by means of connecting a Micro ampere gauge in series with the ionisation thread. The minimum allowed ionisation is 2 µA. The unit will modify its load anyway if the ionisation reaches the bottom limit of 2 µA.

Checking by means of a visual inspection.
- A visual inspection entails viewing and checking of a number of components with regard to their functioning.
  The safety valve may not show any traces of leaks.
  The waste trap should be clean.
  The central heating water filter only requires cleaning if the circulation pump is adjusted at maximum speed and the maximum ΔT is exceeded.

11.6 The frequency of maintenance

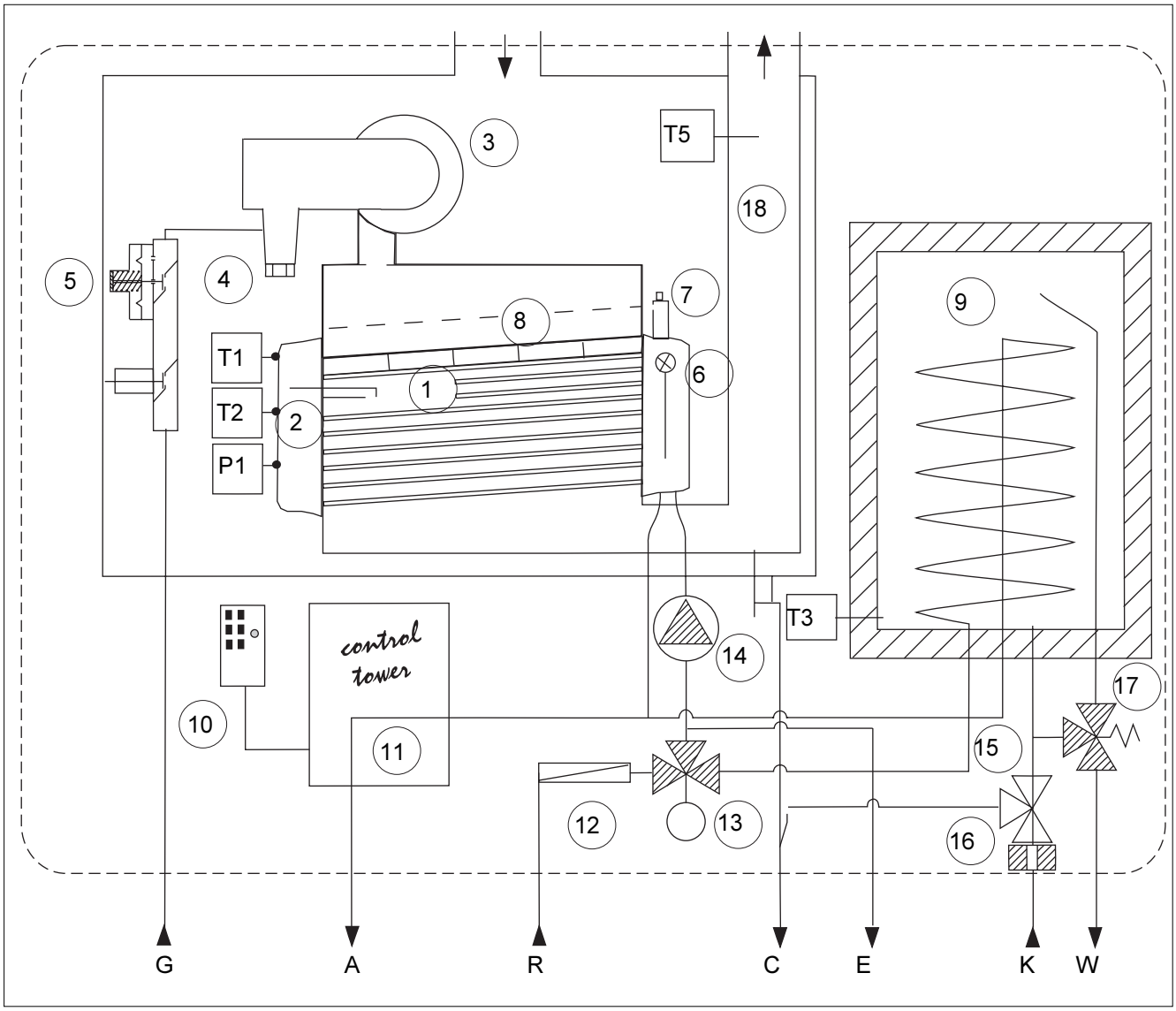
STREBEL advise to carry out an inspection to the unit every two years and an overhaul every four years. When doing this the circumstances of the unit's location must be taken into account, From this one can determine whether to deviate from this advice.

12 Technical specifications

appliance type		S-HR 15	S-HR 24	S-HR 24T	S-HR 35	S-HR 35T	S-HR 51	S-HR 51T	S-HR 60
input (Hs)	kW	15,0	24,0	24,0	35,0	35,0	51,0	51,0	60,0
input (Hi)	kW	13,5	21,6	21,6	31,5	31,5	45,9	45,9	54,0
modulation range (capacity 80/60°C)	kW	3,5-13,3	3,5-21,2	3,5-21,2	4,9-30,9	4,9-30,9	8,8-45,0	8,8-45,0	8,8-52,9
modulation range (capacity 50/30°C)	kW	3,9-14,4	3,9-23,0	3,9-23,0	5,3-33,6	5,3-33,6	9,5-44,9	9,5-44,9	9,5-57,2
efficiency (80/60°C at full load)	%	98	98	98	98	98	98	98	98
efficiency (50/30°C at full load)	%	107	107	107	107	107	106	106	106
efficiency in accordance with EN677	%	109	109	109	109	109	109	109	109
yearly emission of NOx	ppm	12	12	12	12	12	12	12	12
yearly emission of CO	ppm	11	11	11	11	11	11	11	11
CO_2	%	9	9	9	9	9	9,5	9,5	9,5
flue gas temperature (at 80/60°Cat full load)	°C	65	65	65	67	67	68	68	68
flue gas temperature (at 50/30°C at low load)	°C	31	31	31	31	31	31	31	31
burner control			stepless modulation						
gas consumption (at 1013 mbar/0°C) G20	m³/h	1,32	2,10	2,10	3,07	3,07	4,47	4,47	5,26
burner type		ceramic					foam ceramic		
current type	V/Hz	230/50	230/50	230/50	230/50	230/50	230/50	230/50	230/50
maximum electric power recorded	W	122	122	122	145	145	190	190	190
standby electric power recorded	W	5	5	5	5	5	5	5	5
degree of protection according to EN60529		IP 40	IP 40	IP 40	IP 40	IP 40	IP 40	IP 40	IP 40
weight (net)	kg	50	50	73	53	76	63	86	63
water capacity CH-based	l	3,5	3,5	3,5	5	5	7	7	7
water capacity DHW-based	l			14		14		13	
pump overrun time CH	min	15	15	15	15	15	15	15	15
pump overrun time DHW	min			1		1		1	
minimum water pressure	bar	1	1	1	1	1	1	1	1
maximum water pressure	bar	3	3	3	3	3	3	3	3
maximum flow water temperature	°C	90	90	90	90	90	90	90	90
tap flow rate at 60°C	l/min			6		8,5		12,5	
tap flow rate at 45°C	l/min			8,5		12,5		17,5	
pump type	Wilo	ARS 25/70	ARS 25/70	ARS 25/70	ARS 25/70	ARS 25/70	ARS 25/75	ARS 25/75	ARS 25/75
available pump head	kPa	35	25	25	20	20	20	20	12
expansion vessel content	l			12		12			
expansion vessel pre-pressure	bar			1		1			

unit specifications table 11

13 Diagram showing various parts of the unit



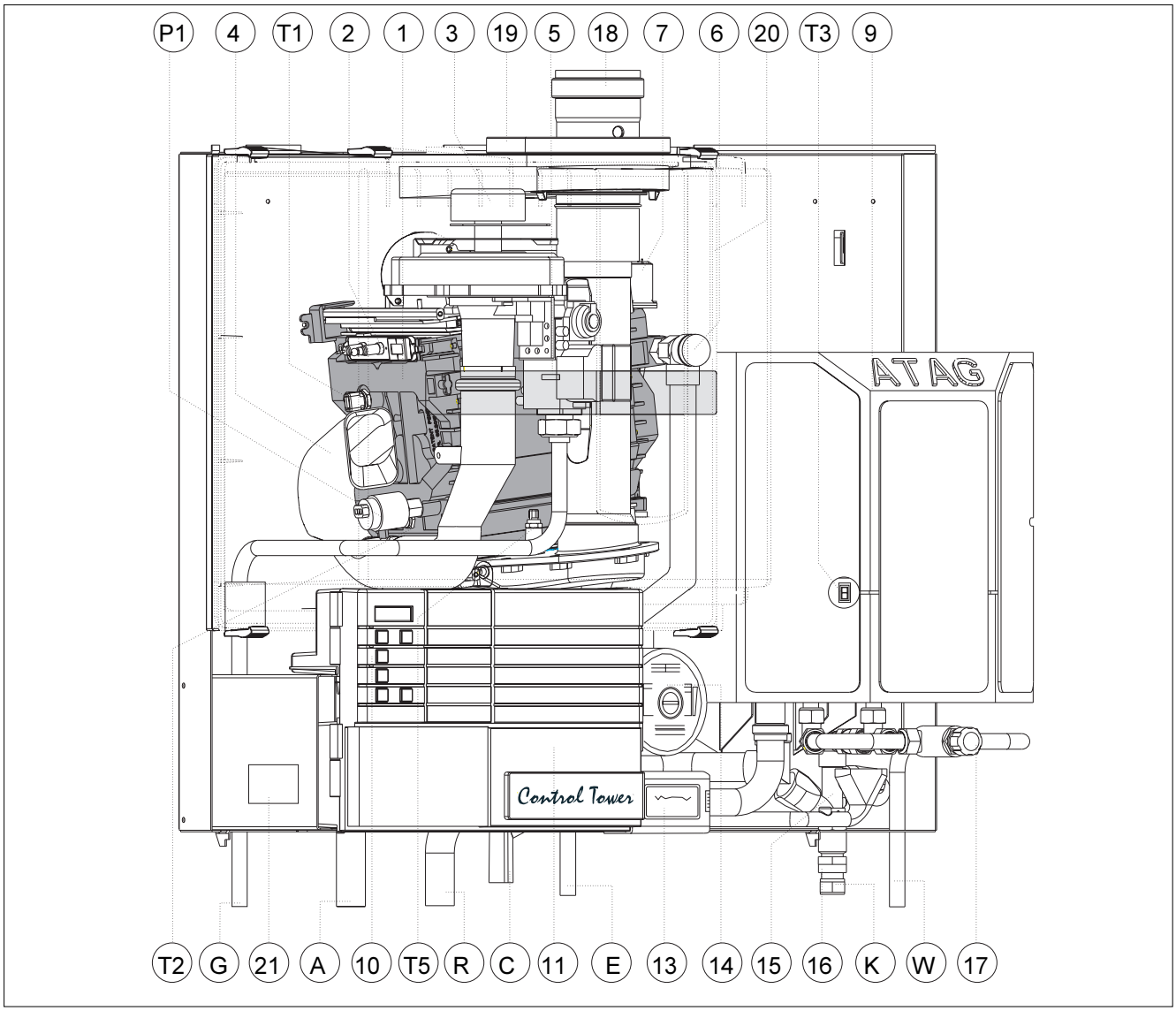
unit diagram

figure 16

G gas pipe
A flow connection central heating
R return connection central heating
C condensation pipe
E expansion tank pipe (S-HR-T)
K cold water pipe (S-HR-T)
W hot water pipe (S-HR-T)

T1 flow sensor
T2 return sensor
T3 calorifier sensor HWS (S-HR-T)
T5 flue gas sensor (if fitted)

P1 water pressure sensor



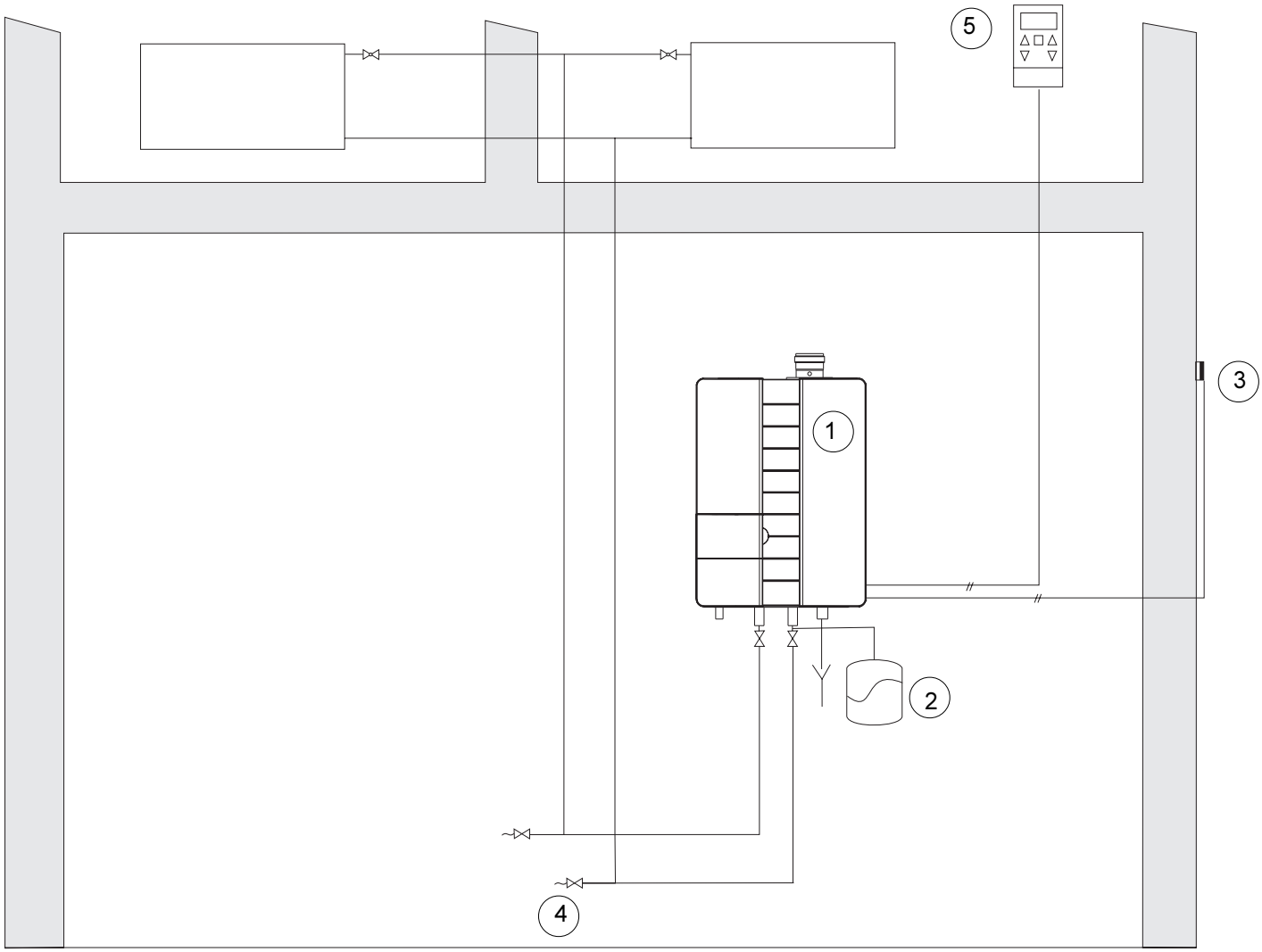
unit description

figure 17

1 heat exchanger
2 ignition unit
3 fan unit
4 air inlet damper
5 gas block
6 safety valve
7 automatic air vent
8 ceramic burner bricks
9 calorifier HWS (S-HR-T)
10 operating panel
11 Control Tower
12 water filter return central heating
13 three-way valve (S-HR-T)
14 circulation pump
15 inlet combination valve (S-HR-T)
16 safety valve (S-HR-T)
17 thermostatic mixing valve (S-HR-T)
18 flue gas discharge
19 combustion air supply
20 air unit
21 type plate

14 Example diagrams for connecting the unit

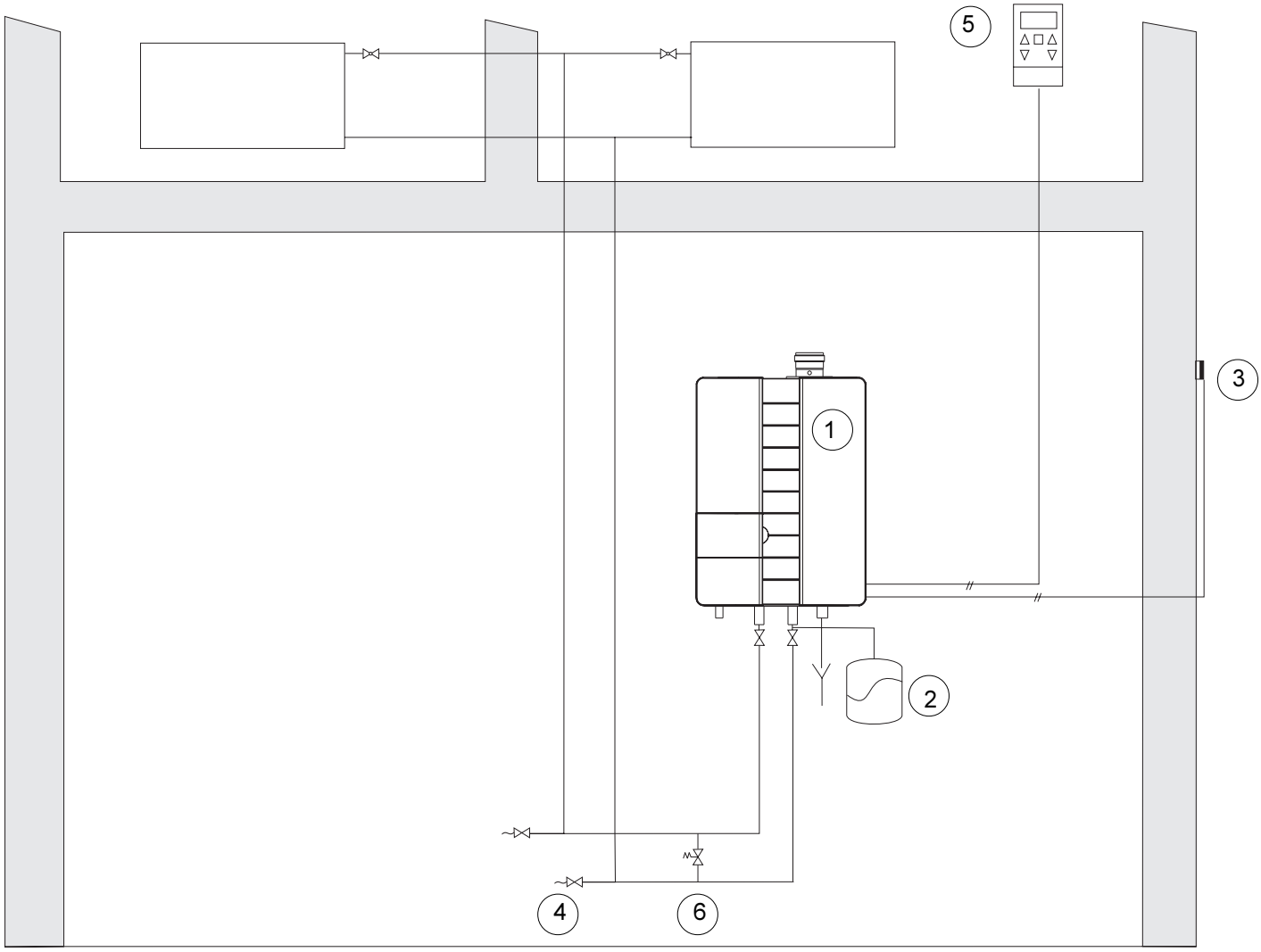
14.1 Radiator installation without thermostat valves



connecting of the unit to a radiator installation without thermostat valves figure 18

1 STREBEL S-HR unit
2 expansion tank
3 outside sensor ARV1205U
4 drain points
5 Brain thermostat AA1RT15G

14.2 radiator installation with thermostat valves only



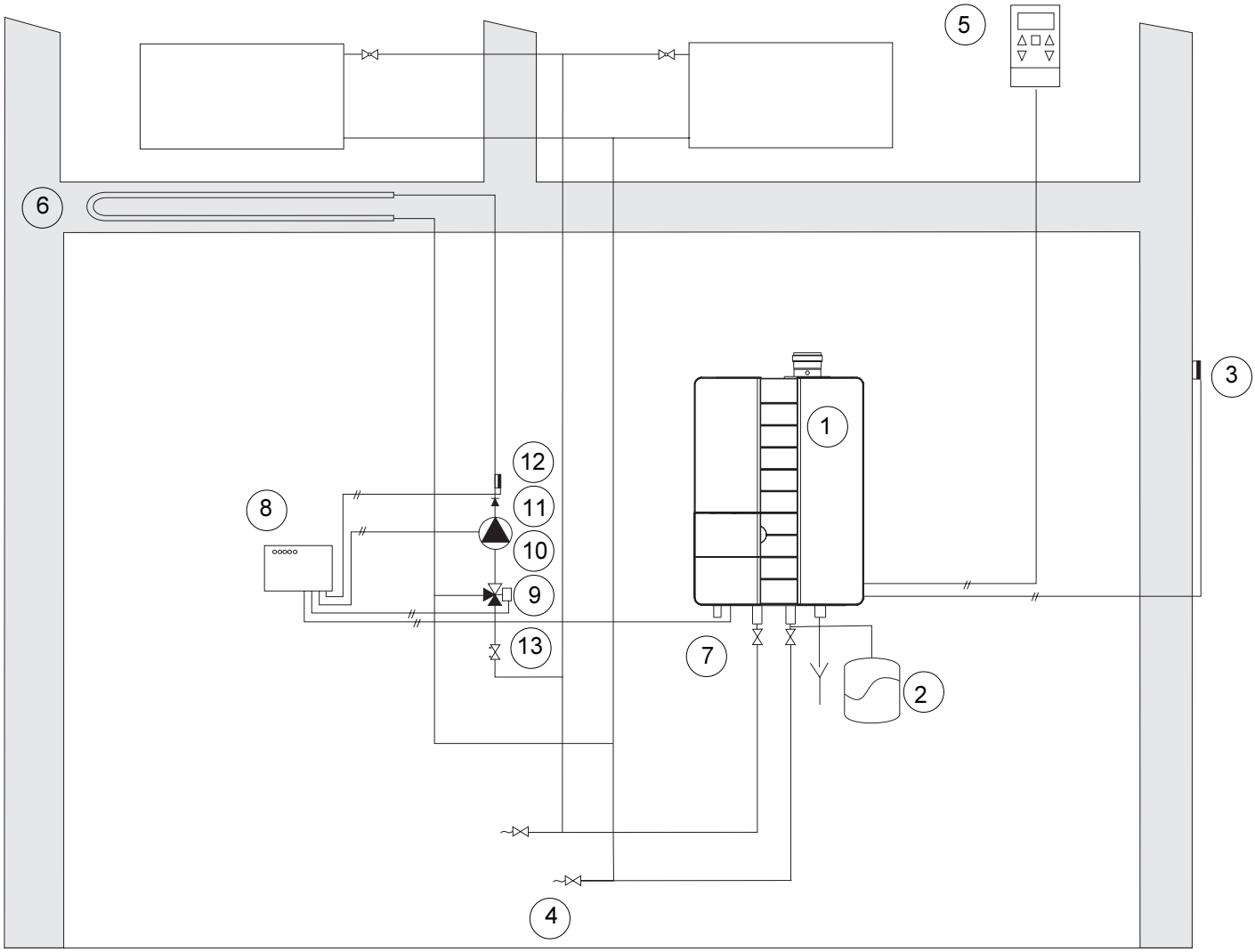
connecting of the unit to a radiator installation with thermostat valves only

figure 19

1 STREBEL S-HR unit
2 expansion tank
3 outside sensor ARV1205U
4 drain points
5 Brain thermostat AA1RT15G
6 by-pass

tra thermostatic radiator valve

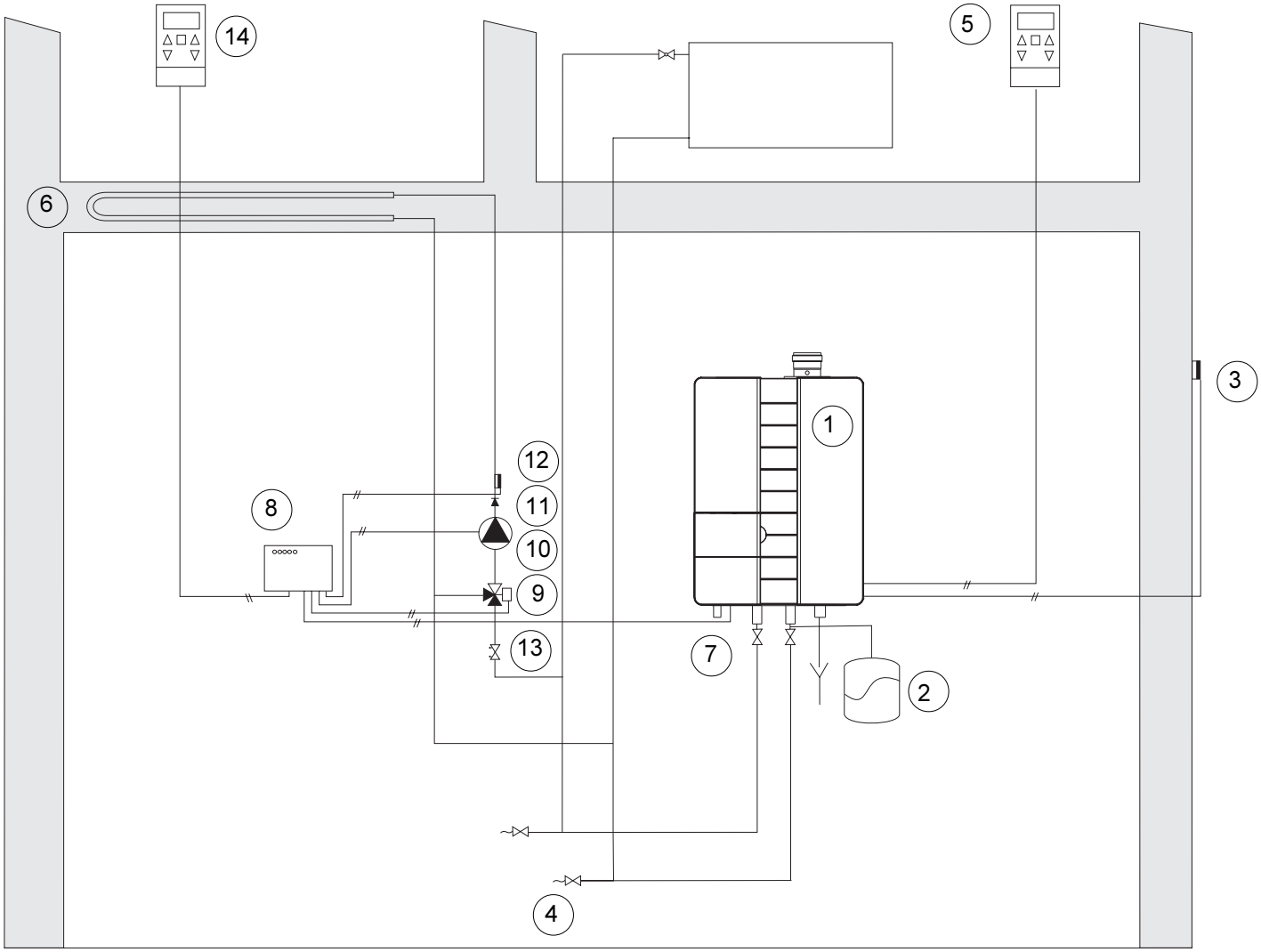
14.3 radiator installation with an under floor heating zone



connecting of the unit to a radiator zone and an underfloor heating zone *figure 20*

1 STREBEL SUPER HR unit
2 expansion tank
3 outside sensor ARV1205U
4 drain points
5 Brain thermostat AA1RT15G
6 underfloor heating
7 2-core sleeve cable
8 zone controller AA1RR15G
9 zone three-way valve
10 zone pump
11 zone non return valve
12 zone flow sensor
13 adjustment valve

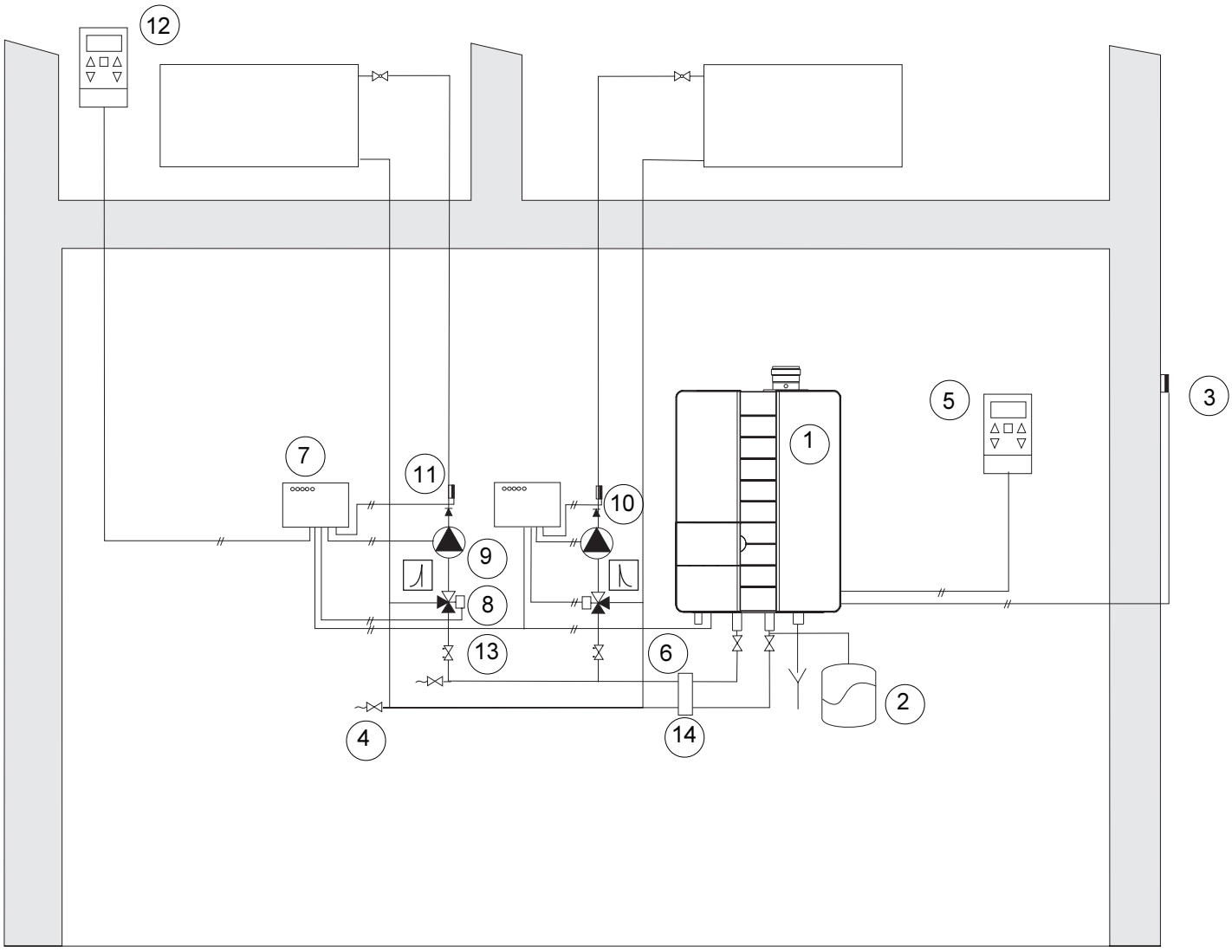
14.4 radiator installation and an independent underfloor heating zone



connecting of the unit to a radiator installation and an independently controlled underfloor heating zone figure 21

1 STREBEL S-HR unit
2 expansion tank
3 outside sensor ARV1205U
4 drain points
5 Brain thermostat Master AA1RT15G
6 underfloor heating
7 2-core sleeve cable
8 group controller AA1RR15G
9 three-way valve group controller
10 pump group controller
11 return valve group controller
12 flow sensor group controller
13 adjustment valve
14 Brain thermostat zone controller AA1RT15G

14.5 two independent radiator zones



connecting of the unit to two independently controlled radiator zones figure 22

1 STREBEL S-HR unit
2 expansion tank
3 outside sensor ARV1205U
4 draining possibility
5 Brain thermostat Master AA1RT15G
6 2-core sleeve cable
7 group controller AA1RR15G
8 three-way valve group controller
9 pump group controller
10 return valve group controller
11 flow sensor group controller
12 Brain thermostat group AA1RT15G
13 adjustment valve
14 low velocity header

15 Error indication

A detected error is indicated on the display by means of blocking or error messages. A distinction should be made between these two messages due to the fact that blocking can be of a temporary nature, however, error messages are fixed lockings. The control will try its utmost to prevent locking and will temporarily switch off the unit by blocking it. Hereunder is a list of some messages.

Blocks bL with a number in the last 2 positions.

bL01 Block 01:
External safety contact cut off

bL11 Block 11:
Maximum ΔT of flow and return sensor in central heating has repeatedly been exceeded. During the block normal operation of the hot water supply is possible. The pump continues to operate at minimum capacity during the block.

bL12 Block 12:
Maximum ΔT of flow and return sensor in domestic hot water has repeatedly been exceeded. During the block normal operation of the central heating installation is possible. During the block the pump continues to operate at minimum capacity.

bL60 Block 60:
Incorrect parameter setting of the minimum or maximum power.

bL67 Block 67:
A ΔT has been detected between flow and return sensor whereas the burner is not in operation. After the ΔT has disappeared the block will disappear.

bL80 Block 80:
Maximum flue gas temperature has been exceeded (if present). The block will not be cancelled until the flue gas temperature has arrived below the temperature.

bL81 Block 81:
The flue gas sensor is not connected although it was connected to the control. The burner is blocked until the flue gas sensor is reconnected.

bL82 Block 82:
The flue gas sensor has short-circuited, heat requirement blocked and pump capacity at minimum.

bL85 Block 85:
The control has not detected a water flow. The venting cycle is started. If during this cycle water flow is detected, the venting cycle is ended and the burner is released.

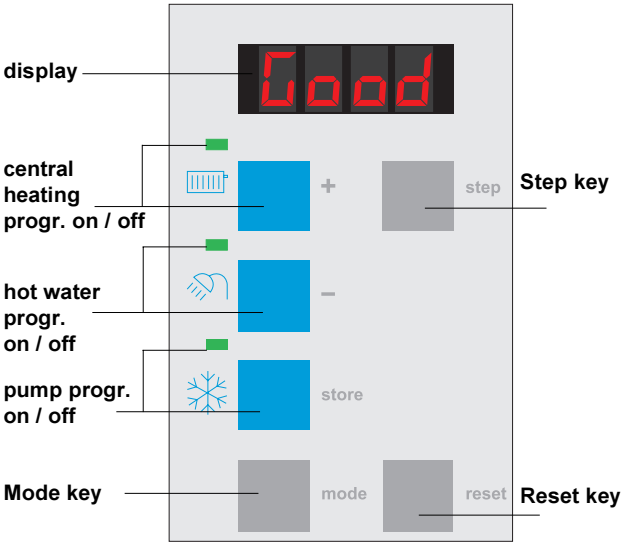
Error E with a number in the last two positions.

E 00 Error 00: Poor flame-forming
E 01 Error 01: short-circuit of 24 volt circuit
E 02 Error 02: no flame-forming
E 04 Error 04: adjustment or error for voltage interruption
E 05 Error 05: adjustment
E 12 Error 12: fuse 24 volt/3AT faulty
E 18 Error 18: maximum flow temperature exceeded
E 19 Error 19: maximum return temperature exceeded
E 28 Error 28: number of revolutions not reported back from fan
E 69 Error 69: no or incorrect display
E 80 Error 80: maximum flue gas sensor temperature exceeded

This renewed publication cancels all previous installation instructions.
The company reserves the right to change the specifications and dimensions without prior notice

E. & O. E.

Explanations of symbols and signs on the Control Tower display.



Mode key ~ Selecting chapters

Step key ~ Scrolling in a chapter

Reset key ~ Unlocking the unit in case of error

Operation indication (in the first display position)

- 0 No heat requirement
- 1 Ventilation phase
- 2 Ignition phase
- 3 Burner active on central heating
- 4 Burner active on hot water
- 5 Fan check
- 6 Burner off when room thermostat is demanding
- 7 Pump overrun phase for central heating
- 8 Pump overrun phase for hot water
- 9 Burner off because of too high flow water temperature
- A Automatic venting programme

FILL Water pressure is too low (<1,0 bar), flashing FILL will be altered with indication of water pressure, unit power of 50% is possible. The installation needs to be topped up.

FILL Water pressure is too low (<0,7 bar), FILL indication remains continuously visible, the unit is taken out of operation. The installation needs to be topped up.

HIGH Water pressure is too high (>3,5 bar), HIGH indication remains continuously visible, the unit is taken out of operation. The installation pressure needs to be decreased by draining water.

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